

EXHIBIT 7

Expert Report of Sheldon V. Masters, Ph.D.
(Bellwether 3)

In Re Flint Water Cases,
U.S. District Court for the Eastern District of Michigan
Civil Action No. 5:16-cv-10444-JEL-MKM
(coordinated docket)

Walters, et al. v. Snyder, et al., Civil Action No. 5:17-cv-10164-JEL-MKM
“Bellwether 3 Trial”

July 26th, 2023

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4 VISUAL INSPECTION OF PIPE SAMPLES FROM FLINT HOMES

On December 7th, 2022, I conducted a visual inspection of pipe specimens taken from two homes in Flint, MI: [REDACTED] and [REDACTED].

[REDACTED] were supplemental report by the plaintiffs' expert (Russell, 2022). The pipes were removed from the homes in February 2022 and included copper and galvanized iron pipes and brass fittings. In general, the copper pipes from both homes were in good condition with no apparent pipe thinning or pitting. Most of the copper pipes that were cut longitudinally had a thin blue-green scale layer which is consistent with the appearance of malachite scales (Arnold Jr. et al., 2012). Sample B from [REDACTED] had inconsistent scratches which a [REDACTED] from a sharp tool (Figure 20).

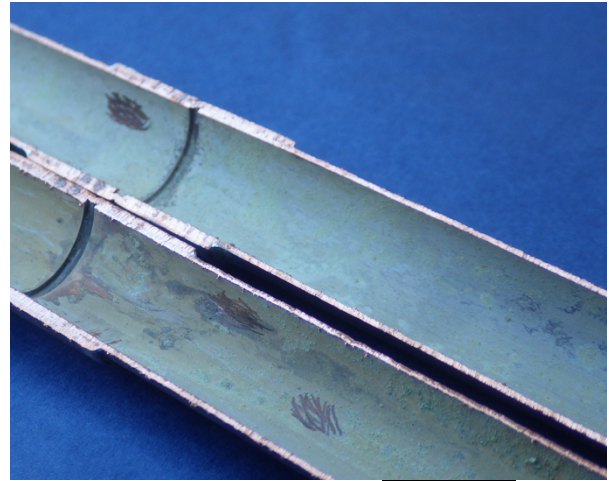


Figure 20. Sample B from [REDACTED]

Most sections of the galvanized iron pipes from both homes were heavily tuberculated which is typical of galvanized iron pipes that have been in service for more than half a century (Edwards et al., 2022). An example of this is shown in Figure 21. Similar kinds of tuberculation can be seen in Figure 22 which shows the cross section of galvanized iron pipe from a Midwest surface water supply that has used blended phosphate for more than 20 years (Wasserstrom et al., 2017). Between 1999 and 2010, this system also had an average lead 90th percentile of 6 ppb (Del Toral et al., 2013).

For the vast majority of galvanized iron pipe sections there was no apparent thinning of the walls. However, wall thinning and failure was apparent at threaded sections. Failure at pipe threads typically occurs because cutting the threads during the manufacturing process removes the galvanized iron coating. Wearing can also increase significantly when streamlines are curved (e.g., at elbows) which results in centrifugal acceleration (Roy, 2018). For example, Figure 23 shows an elbow from a home in Cincinnati, OH where the wall has been penetrated likely due to this phenomenon. However, this kind of wearing was not apparent at of the elbows taken from the two Flint homes. Sample G (galvanized pipe a tee) and Sample H (galvanized iron pipe) from [REDACTED] both had through-wall pits which were likely caused by deposition [REDACTED] the upstream copper pipe. In both of these cases the pits appear to be sealed due to autogenous repair (Tang et al., 2015). Overall, for the age of the pipe specimens that I examined, there did not appear to be significant pipe wall thinning or pitting. Furthermore, most of the corrosion associated with these pipes and fittings occurred prior to 2014.



Figure 21. Galvanized iron Sample D from [REDACTED]

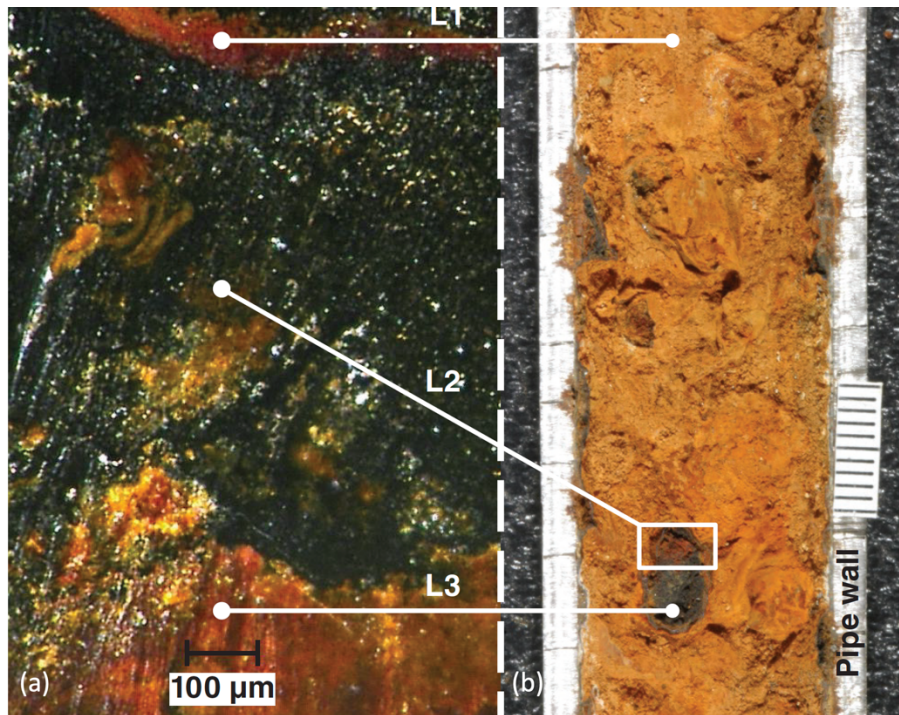


Figure 22. Cross sectional image depicts a) macro-scale image and b) the in-situ scale from a large midwestern city with optimized corrosion control. Image modified from Wasserstrom et al. (2017).



Figure 23. Galvanized iron elbow harvested from home in Cincinnati, OH.

I provide the foregoing opinions to a reasonable degree of engineering and scientific certainty.



Sheldon V. Masters, Ph.D.

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